Non-Ferrous-Metal-Detecting Proximity Sensor (Separate Amplifier Type)

# E2CY-SD

# Proximity Sensor with Separate Amplifier Unit for Detection of Non-ferrous Metals with Simple Sensitivity Adjustment

- Detects aluminum, copper, and other non-ferrous metals.
- Product lineup includes compact, flat Sensor Head (E2CY-V3A) and model with fluororesin (E2CY-C2AF) for resistance to chemicals.
- Simple teaching function to easily adjust sensitivity.
- Check detection status at a glance with numeric values on a digital display.





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Be sure to read *Safety Precautions* on page 6.

# **Ordering Information**

#### Sensors [Refer to Dimensions on page 7.]

		- C					
Appearance		Stable sensing distance		Model	Output configuration	Model	
	M5	1	1.5mm		E2CY-X1R5A 3M		
Shielded	5.4 dia.	1.			E2CY-C1R5A-1 3M		
	8 dia.		2mm		E2CY-C2A 3M	DC 3-wire NPN open collector	E2CY-SD11 2M
	Flat			3mm	E2CY-V3A 3M		
	8 dia.		2mm		E2CY-C2AF 3M		

**Amplifier Units** 

Note: The E2CY-C2AF has a fluororesin head. We also offer a model with a 5-m fluororesin cable. Specify the cable length at the end of the model number. (Example: E2CY-C2AF 5M)

# E2CY-SD

# **Ratings and Specifications**

#### Sensors

	Model	E2CY-X1R5A				
Item		E2CY-C1R5A-1	E2CY-C2A(F)	E2CY-V3A		
Stable sen distance	sing	0 to 1.5 mm	0 to 2 mm	0 to 3 mm		
Differential travel		10% max. of sensing distance with Amplifier Unit in FINE mode 15% max. of sensing distance with Amplifier Unit in NORM mode				
Detectable	object	Non-ferrous metal				
Standard s object	ensing	Aluminum: $8 \times 8 \times 1 \text{ mm}$ Aluminum: $12 \times 12 \times 1 \text{ mm}$				
Response frequency	*1	40 Hz min. with 100 Hz min. wit	Amplifier Unit in h Amplifier Unit i	FINE mode		
Ambient temperatur	e range	Operating: -10 70°C (with no	0 to 55°C, Stora icing or conder	age: –25 to isation)		
Ambient he range	umidity	Operating and (with no conde	Storage: 35%	to 95%		
Temperature	–10 to 55°C	±15% max. of sensing distance at 23°C	±10% max. of sensing	±15% max. of sensing distance at 23°C		
influence *2	0 to 40°C	±10% max. of sensing distance at 23°C *3	distance at 23°C	±10% max. of sensing distance at 23°C		
Vibration resistance		Destruction: 10 to 500 Hz, 2-mm double am- plitude or 150 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions				
Shock resistance		Destruction: 500 m/s <sup>2</sup> 3 times each in X, Y, and Z directions				
Degree of protection		IEC 60529 IP67				
Connection	n method	Pre-wired Models (High-frequency coaxial cable, Standard cable length: 3 m)				
Cable length compensation		0.5 to 5 m *4				
Weight (packed state)		Approx. 35 g				
	Case	Stainless steel Zinc die-cast				
	Sensing surface	Heat-resistant ABS (E2CY-C2AF: Fluororesin)				
	Cable	Soft PVC (E2CY-C2AF: Fluororesin)				
Materials	Clamping nut	Nickel-plated brass (E2CY-X1R5A only)				
	Toothed washer	Zinc-plated iron (E2CY-X1R5A only)				
*1 The average	Mounting screws	Zinc-plated iron (E2CY-V3A only)				

\*1. The average value when using the DC-switching control output on the Amplifier Unit. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the stable sensing distance.

\*2. When the temperature around the Amplifier Unit is stable at 23°C.
\*3. E2CY-C1R5A-1: ±15% max. of sensing distance at 23°C
\*4. When extending the cable, use a 1.5D-2V (equivalent to JIS C 3501) cable with characteristic impedance of 50  $\Omega$ .

#### **Amplifier Units**

Item	Model	E2CY-SD11	
Power supply voltage		12 to 24 VDC $\pm$ 10%, ripple: 10% max.	
Power con	sumption	1,080 mW max. (45 mA max. at 24 VDC)	
Sensing distance adjustment range		10% min. of stable sensing distance	
Sensitivity	setting	Teaching / manual adjustment	
Control ou	tput	NPN open collector (26.4 VDC max.), load cur- rent:100 mA max., residual voltage: 1 V max.	
	OFF-delay timer	0 to 40 ms (1 to 20 ms: 1-ms increments, 20 to 40 ms: 5-ms increments)	
	Zero reset	Supported.	
Functions	Intial reset	Supported. (All settings are returned to their default values.)	
	Hysteresis setting	3 to variable	
	Self diagnosis	Displays errors (sensor disconnection, sen- sor short-circuit, or output short-circuit)	
Operation	mode	Changed with NO/NC switch.	
Protection	circuits	Power supply reverse polarity protection and output short-circuit protection	
Indicator		Operation indicator (orange)	
Digital disp	olay *1	Detection amount display (FINE: 4,000 max., NORM: 2,000 max.), bar display, function display (red)	
Reverse di	splay	Supported.	
Ambient temperature range		Operating: -10 to 55°C, Storage: -25 to 70°C (with no icing or condensation)	
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
Temperature influ- ence *2		$\pm$ 10% max. of sensing distance at 23°C in the temperature range of –10 to 55°C	
Voltage inf	luence	$\pm1\%$ max. of sensing distance in the rated voltage range $\pm10\%$	
Insulation	resistance	20 $M\Omega$ min. (at 500 VDC) between current-carrying parts and case	
Dielectric s	strength	1,000 VAC, 50/60 Hz for 1 minute. between current-carrying parts and case	
Vibration r	esistance	Destruction: 10 to 150 Hz, 1.5-mm double amplitude or 100 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions	
Shock resi	stance	Destruction: 300 m/s <sup>2</sup> 3 times each in X, Y, and Z directions	
Degree of protection		IEC 60529 IP50 (with Sensor cable con- nected and protective cover attached)	
Connection method		Pre-wired Model (Standard cable length: 2 m	
Weight (packed state)		Approx. 100 g	
	Case	РВТ	
	Cover	Polycarbonate	
Materials	Cable connecting screws	Zinc-plated iron	
Accessories		E39-L143 Mounting Bracket (SUS304 stainless steel), instruction manual	
*1. If the Sensor approaches		s iron or other ferrous metals, the digital display wi	

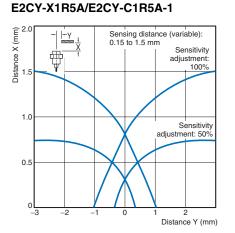
\*1. If the Sensor approaches iron or other ferrous metals, the digital display will show negative values.

\*2. When the temperature around the Sensor is stable at 23°C.

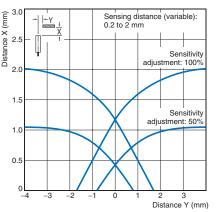
Note: You can mount the Amplifier Unit on a DIN Track without using the Mounting Bracket.

# **Engineering Data (Typical)**

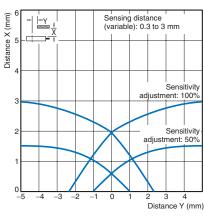
#### Sensing area



#### E2CY-C2A(F)

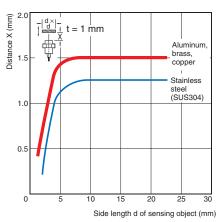


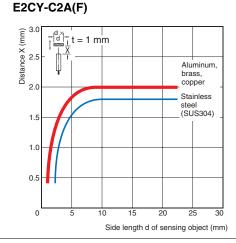




## Influence of Sensing Object Size and Material

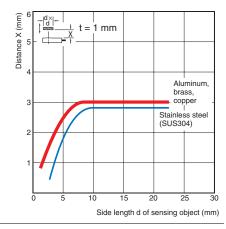
#### E2CY-X1R5A/E2CY-C1R5A-1





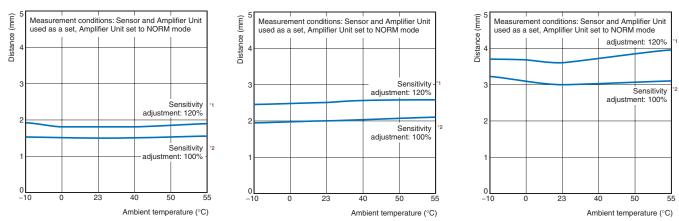
#### E2CY-V3A

E2CY-V3A



#### Temperature influence

#### E2CY-X1R5A/E2CY-C1R5A-1

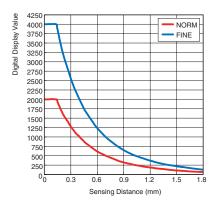


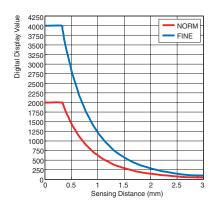
\*1. When the set distance is the maximum stable sensing distance multiplied by 1.2 and at an ambient temperature 23°C. \*2. When the set distance is the maximum stable sensing distance and at an ambient temperature 23°C.

E2CY-C2A(F)

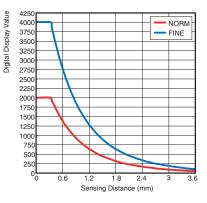
### Sensing Distance Vs. Digital Display Value

#### E2CY-X1R5A/E2CY-C1R5A-1



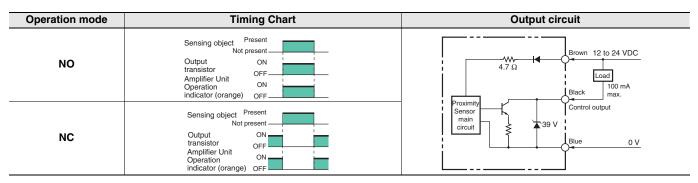


E2CY-C2A(F)

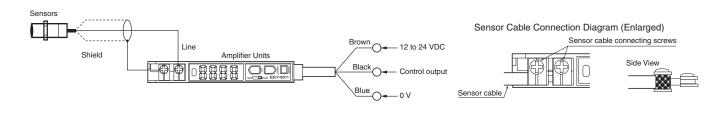


E2CY-V3A

# I/O Circuit Diagrams

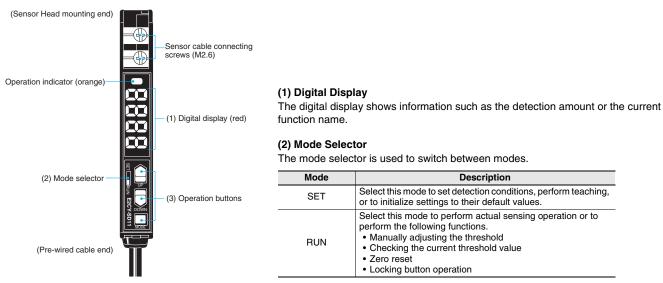


## Connection



## Nomenclature

#### **Amplifier Units**



#### (3) Operation Buttons

Use these buttons to change the display or to change the function settings. Button functions depend on the current mode.

Button	SET Mode	RUN Mode
UP Button	Changes the function in the forward direction. Changes the set value in the forward direction. Performs positioning teaching.	Increases the threshold value.
DOWN Button	Changes the function in the reverse direction. Changes the set value in the reverse direction. Performs teach- ing without a workpiece.	Decreases the threshold value.
MODE Button	Selects the function. Selects the set value.	Checks the current threshold value. Performs a zero reset.

#### The following table lists the available functions.

		Description		
Function	Set value	Change function: UP/DOWN Buttons Change set value: UP/DOWN Buttons Select function: MODE Button Select set value: MODE Button		
ŁEch	Sensing threshold value	Performs the following types of teaching: • Teaching without a workpiece • Positioning teaching • Teaching with/without a workpiece		
1- <b></b> _p	NO/NC	Changes the operation mode. • NO (normally open): Turn output ON when an object is detected. • NC (normally close): Turn output ON when no object is detected.		
2-fn	NORM/FINE	Changes sensor precision. • NORM: Standard * • FINE: High precision		
3-tf	0 to 40ms	Changes the OFF-delay time. Sets a delay between 0 to 20 ms in increments of 1 ms. Sets a delay between 20 to 40 ms increments of 5 ms.		
4-dp	Value/segment bar	Changes the detection amount display.		
5-r⊔	Normal or reverse	Changes the display direction. Normal: The Sensor is connected to the left end. Reverse: The Sensor is connected to the right end.		
6-hy	3 to variable	Changes the hysteresis width.		

\* FINE Mode enables you to perform measurements at twice the step of NORM Mode. However, this results in a slower response.

# E2CY-SD

## **Safety Precautions**

#### Refer to Warranty and Limitations of Liability.

#### <u> WARNING</u>

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



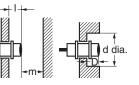
## **Precautions for Correct Use**

Do not use the product under ambient conditions that exceed the ratings.

#### Design

#### Influence of Surrounding Metal

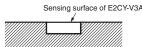
When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.



#### Influence of Surrounding Metal (Unit: mm)

Model Ite	n I	d	D	m
E2CY-X1R5A		5		0
E2CY-C1R5A-1		5.4	0	9
E2CY-C2A(F)	0	8		15
E2CY-V3A		12		18

The E2CY-V3A can be embedded in metal with the sensing surface at the same level as the metal surface.



#### **Mutual Interference**

When installing Sensors face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.

#### Mutual Interference (Unit: mm)

Model	Item	Α	В	╶╼┨╌┋┋┫╴╴╶┫╴╣╶╌╞╾
E2CY-X1R5A				- A ->
E2CY-C1R5A-1		20	15	_
E2CY-C2A(F)				┍┰╴┫══╾
E2CY-V3A		30	12	□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

#### Effects of a High-frequency Electromagnetic Field

If the Sensor is located near a device that generates high frequencies or a transceiver, it may be affected by such a device and malfunctions may occur.

#### Mounting

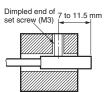
• Do not use excessive force when tightening the nuts on the E2CY-X1R5A. A toothed washer must be used with the nut.



1	Model	Torque			
	E2CY-X1R5A	0.98 N⋅m			
	Note: The above leeways in tighten torque				

assume that a toothed washer is being used.

Mounting Unthreaded Cylindrical Models
 When using a set screw, tighten it to a torque of 0.2 N·m max.



 Do not tighten the mounting screw for the E2CY-V3A with excessive force. Always use a washer when tightening the mounting screw.

Model	Torque
E2CY-V3A	0.15 N·m

#### Adjustment

#### **Power ON**

The E2CY requires a minimum of 200 ms from the time the power supply is turned ON before it can begin detection. Do not remove the Sensor Head while the power supply is turned ON. If the E2CY-SD11 and load are connected to separate power supplies, always turn ON the power supply to the E2CY-SD11 first.

#### Power OFF

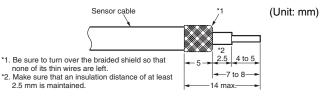
Output pulses may occur when the power supply is turned OFF. Turn OFF the power supply to the load or load line first.

#### Teaching

Make sure that the Sensor is in operating condition before making sensitivity adjustments.

#### **Processing the Sensor Cable Ends**

When cutting or extending the cable, the end of the Sensor cable connected to the E2CY- must be processed as shown in the following illustration.



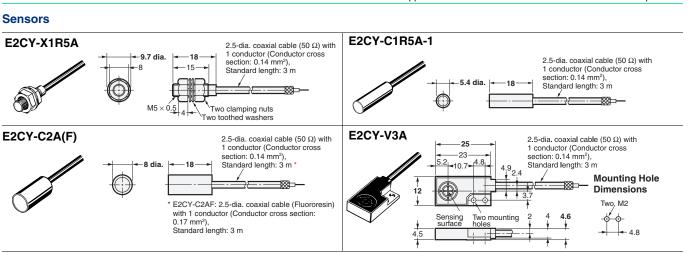
The length compensation range for cutting or extending the cable is 0.5 to 5 m. When extending the cable, use a 1.5D-2V (equivalent to JIS C 3501) cable with characteristic impedance of 50  $\Omega$ . Amplifier Unit Cable Extension

Do not extend the cable to more than 30 m. Use a cable of 0.3  $\rm mm^2$  or greater for extensions.

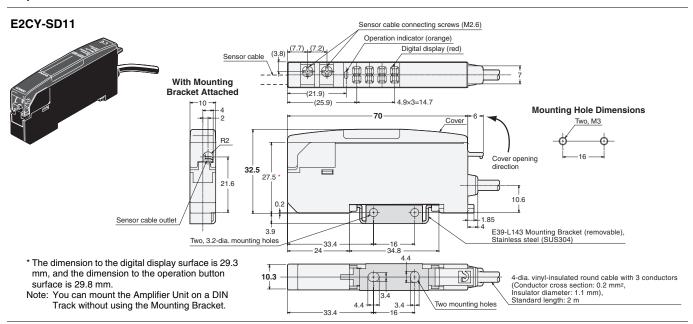
# E2CY-SD

## Dimensions

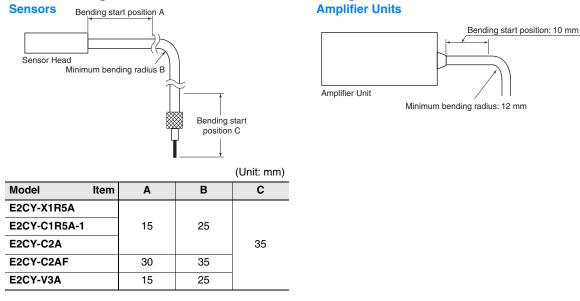
(Unit: mm) Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.



#### **Amplifier Units**



## Cable Bending Start Position and Minimum Bending Radius



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